Abstract Submitted
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Gilbert damping up to 300 GHz in Ni81Fe19[1] YI LI, Columbia University, A.-L. BARRA, CNRS, France, S. AUFFRET, U. EBEL, SPINTEC, UMR, France, W.E. BAILEY, Columbia University, BAILEY'S GROUP TEAM, CNRS COLLABORATION, SPINTEC COLLABORATION — High magnetic fields (>10 T) at central facilities, combined with frequency sources approaching 1 THz, enable studies of ferromagnetic resonance (FMR) in a new frequency range. To date, the upper frequency limit of FMR studies of the technologically important alloy $Ni_{81}Fe_{19}$ (Py) has been 70 Ghz. No experiments have addressed whether the relatively high levels of Gilbert damping α in this alloy (6-9$\times 10^{-3}$), described by $\Delta H = \Delta H_0 + \alpha\omega/\gamma$, where ΔH is the field-swept linewidth, ΔH_0 is the inhomogeneous broadening, and $\omega/2\pi$ is the microwave frequency, represent a low-frequency limit of richer behavior near THz frequencies. In this work, we compare perpendicular FMR measurements of $Ni_{80}Fe_{20}$(5nm) between 4-24 GHz, using a laboratory electromagnet and coplanar waveguide, with measurements at 331.2 GHz and 4-295 K using a 16 T superconducting magnet. We find a consistent Gilbert-type damping between the low- and high-frequency data, with the former predicting a linewidth of 193.4 ± 9.5 mT from the extrapolation and the latter resulting 189.8 ± 6.2 mT.

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